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VILLAGE OF ARTHUR GROUND WATER SURVEY

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Ministry
of the
Environment

The Honourable
George A. Kerr, Q.C.,
Minister
Everett Biggs,
Deputy Minister

MINISTRY OF THE ENVIRONMENT

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VILLAGE OF ARTHUR

GROUND WATER SURVEY

I. R. STELTNER

1976

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GROUND WATER SURVEY

VILLAGE OF ARTHUR

INTRODUCTION

The Village of Arthur requested the Ministry of the Environment to conduct a ground water survey of the area to assist the Village in locating additional well-water supplies.

This report summarizes information from existing well records, technical reports and field investigations and presents conclusions on existing ground-water conditions and recommendations for the development of additional ground-water supplies.

The area investigated in this report extends to a three-mile radius from the town-centre. Well records have been located on Drawing No. 1 and are listed in Table No. 1. Chemistry and bacteriological sample analyses of 18 wells are presented in Tables No. 2 and 3.

WATER REQUIREMENTS

The existing water works system is maintained by the Arthur Public Utilities Commission and is supplied by four wells. Three primary production wells can produce approximately 185 gpm (14 l/sec) while a fourth standby well is capable of 65 gpm (51 l/sec). An additional fifth well, rated at 130 gpm (10 l/sec) produces water of poor quality (see Tables 2 and 3) and is used only to supplement fire or peak requirements.

In peak demand periods, especially during the summer months, the total production of 250 gpm (19 l/sec) falls short of the requirements. At present, approximately 29 percent of the total production is utilized by Bell Thread Co. Ltd. but this is expected to increase another 10% once the plant expansion has been completed.

The water supply system is capable of supplying present average day demands but requires expansion to supply future water demands. Information provided by the Environmental Approvals Branch indicated that the 1998 demand of the community would require an additional 175 gpm (13 l/sec) average day and 400 gpm (30 l/sec) maximum day.

SURFICIAL GEOLOGY AND HYDROGEOLOGY

According to Putman and Champman (1972), the Village of Arthur is located on a nearly flat till plain. The till plain is comprised of a heterogenous mixture of clays

and silt with stones and boulders having a low permeability. The till sequence can vary in thickness from 150 feet (46 m) in the north to 250 feet (76 m) to the south of Arthur.

Within the till sequence, horizons of poorly sorted sands and gravels are reported. Layers of clay are observed throughout the coarser deposits. To the south of Arthur domestic wells have located water bearing horizons about 10 feet (3 m) thick. The overall water yielding capacity appears to be restricted as the horizons are limited in their lateral extent, permeability and recharge potential.

Approximately 27 of the 62 wells considered in this report located sufficient water for domestic supplies within the overburden formations at depths of about 150 feet (46 m) below ground level.

The average yield produced by the overburden wells is in the order of 12 gpm (under 1 l/sec) although a flowing well, number 104 has reported a yield of 25 gpm (2 l/sec). Overburden wells having static water levels above ground level are found along the banks of the Conestogo River primarily to the west of Arthur. The water bearing formation comprised of coarse sand and gravel occurs at an elevation of about 1280 feet (390 m) above sea level.

Some coarse saturated overburden horizons are able to supply 25 gpm (2 l/sec) but as the horizons are not uniformly saturated and are sporadic in distribution and permeability it is unlikely that these formations can yield the minimum required 175 gpm (13 l/sec) from a single well.

BEDROCK GEOLOGY AND HYDROGEOLOGY

Shale, dolomite and limestone of the Silurian Period are the dominant rock types found underlying the Arthur area. The geological sequence as interpreted from gas, oil and water well logs is as follows:

A - QUATERNARY PERIOD

Pleistocene - glacial till, moraines and drumlins about 200 ft.
(60 m) thick

- rock interface is sporadically water bearing

B - SILURIAN PERIOD

Salina Formation - red and green shales with anhydrite horizons
- also brown dolomite about 30 ft. thick (9 m)

Guelph Formation - grey brown limestone and dolomite with reefal and bioherm structures

- jointing and porous zones present
- water bearing in most areas
- some dark dolomite in lower strata
- about 300 feet (90 m) thick
- gradational contact

Amabel Formation - grey, tan crinoidal limestone, some black dolomite

- about 60 feet (18 m) thick

Cabot Head Formation - grey and red shale with gypsum

- about 40 feet (12 m) thick

Drawing No. 2 shows most of the Arthur area is underlain by the Salina Formation, shales and brown dolomite, save the north-east corner of the study area where the Guelph Formation occurs. The bedrock surface also presented in Drawing No. 2 is relatively flat and sloping westward.

The Salina Formation is not fully developed in this area as the anhydrite deposits are not generally encountered. When anhydrite is present it contributes sulphates to the water which is in contact with the formation. Generally the Salina Formation is about 10 to 50 feet (3 to 15 m) thick.

The Guelph Formation underlies the Salina Formation and is composed of medium crystalline dolomite and limestone. The lower zones have been described as containing dark bituminous limestone strata but are not continuous over the area.

Because a gradational sequence occurs between the Guelph and the underlying Amabel Formation the contact is often not recognized in down hole drilling. For this reason the Guelph Formation and the Amabel Formation is reported to be about 360 feet (110 m) thick. Zones of bituminous limestone are also found within the Amabel Formation.

When the bituminous layers occur within a saturated sequence the water which is contained in the formation is expected to have elevated concentrations of sulphate which could make the water undesirable for drinking. Well No. 2124 appears to have located these strata at about 300 feet (90 m) below grade.

The Cabot Head Formation is comprised of red and green shales with gypsum

deposits. The thickness of this formation is estimated to be about 40 feet (12 m). Characteristically the water from this formation is unsuitable for drinking due to elevated sulphate concentrations. Within the Arthur area the Cabot Head Formation is expected to be situated at a depth of 500 feet (150 m) below grade.

Water yielding zones, or aquifers if they are economical, within the bedrock are limited to bedding planes, fracture zones and porous horizons. Their interconnection limits the ultimate yield of a bedrock well. The overall permeability of the rock can vary tremendously from site to site.

The first water bearing horizon encountered below the overburden till sequence occurs at the rock interface. Approximately 70 percent of the 35 bedrock wells find sufficient water supply at this zone for domestic use. The average yield of these wells is in the order of 18 gpm (1 l/sec).

Nine well records report having penetrated beyond 50 feet (15 m) into the rock to locate sufficient water and yields of 15 gpm (1 l/sec) can be found. The water at these depths is extracted from the dolomites of the Guelph Formation.

The municipal wells producing about 216 gpm (16 l/sec) find water within the Guelph Formation at depths between 300 feet and 370 feet (90 and 110 m) below grade and about 140 feet to 160 feet (43 to 49 m) of rock penetration. These wells do not report any bituminous strata within the limestone. Only Well No. 1 of the P.U.C. penetrates beyond this depth to about 500 feet (152 m) below grade, probably to intersect the Cabot Head Formations. The yield is as high as 130 gpm (10 l/sec) but the water quality is poor (Table 2).

Based on the available data it appears that the bedrock aquifers within the Guelph Formation offer the better potential for finding the additional water requirements of 400 gpm (30 l/sec). The total yield may not be available from one well and possibly two wells may ultimately be required to supply the present maximum day demands.

WATER CHEMISTRY

Water samples were randomly collected at 18 wells; nine bedrock wells and nine overburden wells. The results are summarized in Table 2.

Generally the water quality is good and suitable for municipal use. Sulphates may be elevated but generally do not exceed MOE standards. The concentration of iron

may vary from .05 ppm to 3.0 ppm and treatment processes may be required to reduce these concentrations to acceptable levels. Ground water quality in the Arthur area appears to deteriorate with depth.

Although the upper Guelph Formation may yield good quality water, on approaching the contact with the underlying Cabot-Head shales significant sulphate effects on the water render the water unacceptable for municipal purposes (see Table 2).

Bacteriological analyses were completed at the above 18 sites and are listed in Table 3. These results indicate a low bacteriological population in the deeper aquifers and therefore a limited susceptibility to contamination from the surface. The effects occur throughout the area.

The sewage lagoon located to the east of Arthur is of a retention design. It is located on the till sequence and leakage of effluent has not been observed to be a problem.

CONCLUSIONS

In summary the main aquifers encountered within the Arthur area occur as granular material within the overburden till formations, the overburden rock interface and throughout the Guelph-Amabel Formation.

The overburden aquifers have never been systematically explored to determine their true potential. Based on the existing data, the limited permeability and lateral extent, wells tapping the granular horizons are not expected to yield in excess of 40 gpm (3 l/sec) on a perennial basis.

Bedrock aquifers offer the better potential for developing additional ground water supplies. The rock aquifers are more persistent throughout the area, although when penetrating in depths in excess of 400 feet (120 m) the risk of encountering poor water increases. Wells having yields of up to 85 gpm (6 l/sec) are presently in production and the corresponding water quality is suitable for municipal distribution. Iron treatment may be required.

Bedrock aquifers in the Arthur area are likely capable of yielding the sufficient water quantity to meet the additional long term water requirements of 400 gpm (30 l/sec). The possibility exists that more than one well will be required to

develop the additional water supply.

A test drilling program evaluating the aquifers within the Guelph-Amabel Formation should be carried out within areas outlined in Drawing No. 2. The drilling program should include testing of water yielding overburden formations. Test hole depths greater than 400 feet (120 m) are not recommended. The testing program should also be designed to determine the optimum well spacing with regard to limiting the amount of mutual well interference to the existing municipal supply wells. Based on those findings, the aquifer can then be developed to its fullest potential.

Priority should be given to sites which are nearest the existing well supply system and where the interference with those wells is minimal.

FAVOURABLE TEST DRILLING AREAS

Outlined in Drawing No. 2 are three areas which offer the best potential for locating additional water supply of good quality in close proximity to the existing water distribution system but remote to the existing production wells to minimize mutual interference.

Area 1, located east of Highway No. 6 and north of Highway No. 9 should be drilled initially. The overburden is expected to be approximately 200 feet (60 m) thick. Either shale or limestone could be encountered. The main water bearing horizon is located within the Guelph-Amabel Formation at a depth of about 300 feet (90 m). Granular horizons are reported within the overburden and testing of these should also be considered. The water quality is good but iron concentrations could be as high as 3.0 ppm Fe. Although the sewage lagoon area may not be the most aethetic for locating municipal wells, the thickness of the impermeable overburden till formation is sufficient to prevent contamination.

Area 2, located south of Highway No. 6 and east of Highway No. 9, is a little more remote from the existing distribution system. Overburden can be up to 250 feet (75 m) deep. Water bearing granular horizons can be expected at depths of about 100 feet (30 m) and 240 feet (70 m). Limestone is encountered and water bearing formations occur at an overall depth of about 250 feet (75 m) to 300 feet (90 m). Iron concentrations within the water are expected to be lower than found in Area 1. The utilization of both overburden and bedrock aquifers could likely increase the overall

per well.

Area 3 is located south of the Conestogo River and the Village of Arthur along Highway No. 9, west of Highway No. 6. Similar overburden conditions prevail as in Area 2. Granular horizons can occur at depths of about 50 feet (15 m) and 150 feet (45 m). Bedrock consists of limestone and water bearing zones can occur at a depth of about 300 feet (90 m). The water quality within the overburden is good but the possibility of encountering elevated sulphate concentrations in the bedrock increases with the distance west of Highway No. 6. The poor water from the rock when mixed with the better water from the overburden could result in a useable water supply.

RECOMMENDATIONS

If it is decided to further expand the existing ground water supply system, it is recommended that test drilling be undertaken at sites shown in Drawing No. 2.



REPORT BY:

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APPROVED BY:

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IRS/af

7/12/76

Table 1 Summary of Water Well Record

Date _____

ARTHUR GROUND WATER SURVEY

Well No	Location and Elevation con lot	Owner	Driller	Well Type year	Well Diameter (inches)	Depth (feet)	Static Level (feet)	Pumping Test (gpm/hr)	Pumping Level (feet)	Quality	Use	Remarks Log etc
2 1500	ARTHUR VILLAGE	WELL #2 VILLAGE OF ARTHUR	GRAHAM 50	① 10	288	30	8	70	130	FR	#2 MUN	0 ft 150 ft 155 ft 155 ft 285 155 gr, abt 159 ad 183 6187 ab 288
3 1502		A. HARBORTE	DURHAM 63	① 4	179	60	10	19	75	FR	D	0 to 4 gr, bld: 20 cl 40 40 std cl 100 std cl 115 115 ad 150 ad 161 161 179
4 1515		WELL #4 VILLAGE OF ARTHUR	GRAHAM 66	① 10	372	35	1/2	85	235	FR	MUN	0 to 166 ab, ab 45 std 60 60 cl ab 82 cl 140 ab 164 372 164 ab 91 ad 168 ab 372
1 1510		WELL #1 VILLAGE OF ARTHUR	IWS 32	① 8	500	30	-	-	182	FR	#1 MUN	c cl 37 fod 41 ab gr, ab 48 ab 48 ab gr, bld 97 fod 103 cl 107 cl 60, ab 122 122 fod 91 137 cl, gr 168 fod 91 cl 164 ab 188 188 mudar 191 gr, ab 155 ad 161 162 1650 c b1 cl, ab 103 hp 111 104 8 293, 148 hp 152 ab 360 360
13 1527	I 24	R. GORNETT	DAVIDSON 54	① 4	360	18	6	8	92	FR	D S	0 65 gr, ab 20 cl fod 60 60 ab, gr 100 fod 91 125 cl, gr 160 160 ab, ab 181 ab 200
14 1515	I 27	G. EDEN	DURHAM 63	① 4	200	32	4	10	50	FR	D S	0 65 gr, ab 20 cl fod 60 60 ab, gr 100 fod 91 125 cl, gr 160 160 ab, ab 181 ab 200
24 1426	III 29	N KIONIC	DURHAM 63	⑤ 4	150	flow +	4	10	40	FR	D S	0 Dug 200 cl ab, gr 85 85 cl 144 ab 10, gr 150 150
27 1442	IV 29	E. SMALL	SANDER 64	⑤ 5	163 1/2	flow +	27	-	-	FR	D S	0 64 cl 23.1 ab 60 60 organic silt 15 cl 05 105 ab 117 ad 151 cl 162 162 ab 91 163 1/2
88 1475	EOSE 28	J. McCABE	DAVIDSON 62	① 4	144	15	15	4	32	FR	D S	0 Dug 7 hp 32 cl 05 mar 126 128 hp 135 ab 201 144
89 1470	EOSE 35	R. RANDALL	DAVIDSON 51	⑤ 4	263	43	25	-	-	FR	D S	0 cl 63 till 191 ab 263 263
99 1480	EOSE 30	J. McCABE	DAVIDSON 62	① 4	222	34	5	10	50	FR	D S	0 cl 8 102 40 58 hp 95 95 ad 105 ab 4 hp 196 ab 222
100 1480	EOSE	S. SHARPE	DURHAM 64	① 4	212	28	10	15	35	FR	D S	c dug 22 cl 100 std cl 150 150 ad 180 fod 20 ab 205 205 ab 212

Table 2 Summary of Water Well Records

Date

Prepared by

Well No	Location and Elevation		Owner	Driller	Well Type	Well Diameter (inches)	Depth (feet)	Static Level (feet)	Pumping Test (gpm/hrs)	Pumping Level feet	Quality	Use	Remarks Log etc
	con	lot			year								
101	1475	Wose	32	D. FAIRBAIKEN	SAUER	60	1	5	190	18	18	D	O Dug 52 cl, d20 62 cl 104 104 ad 4 cl 130 ad, cl 144 hp 180 180 cu ad cl 189 2190
103	1460	Wose	35	PENTECOSTAL CAMP	LAOCO	61	1	30	19	14	4	D	O 61 cl 9 gr 19 R 9-19
104	1435	Wose	35	PENTECOSTAL CAMP	DURHAM	62	1	5	140	FLOW	225	D	O 62 cl 5 cl, bld 125 125 ad 132 gr 140
3297	1475	Wose	34	M. WAGNER	GADKE	69	1	5	421	24	15	S	O 62 cl 30 hp 190 gr 200 200 ad 205 ad 421 R 412-420
3566	1500	14	4	N. PITIRRI	CERALTA	69	1	5 1/4	151	25	4	D	O cl 95 ad 4 cl 98 ad, bld v 147 R 147-147 gr, ad 151
3466	1475	6W	35	W. LIGHTHEART	DURHAM	69	1	4	220	4	10	D	O 65 gr, bld 45 ad, cl 70 70 ad, gr 100 cl, gr 120 gr 160 160 ad, gr 172 162 220
3603	1480			ARTHUR PUC	1WS	69	1	2	189	22	5	FR	AB. O cl 7 cl, gr, ad 14 cl, gr 37 37 ad gr 38 cl, gr 80 cl, gr 141 166 186 b189
3637	1480			WELL #5 ARTHUR PUC	1WS	70	1	10	350	33	7	MUN	O cl, gr 16 cl, ad gr 180 cl, gr 186 R 240 186 b350
3977	1500	Wose	27	P. SPACK	LAOCO	71	1	4	190	43	11	D	O cl, gr 174 ad 174 182 R 189 182 16190
3798	1475	6W	35	ZAI & AMMO	KEESO	70	1	5	168	33	12	S	O 63 gr, cl 7 cl 147 147 ad 157 cl, gr 168
2880	1525	I	36	H. SARTISSEN	DAVIDSON	59	1	4 1/4	308	70	3 3/4	D	O cl 6 ad, ad 148 148 hp, ad 245 ad 247 16308
2881	1530	I	36	A. HOERET	GADKE	63	1	4	112	40	8	S	O cl 45 ad, gr 112 R 112



Table 3 Summary of Water Well Records

Well No	Location and Elevation		Owner	Driller	Well Type	Well Diameter (inches)	Depth (feet)	Static Level (feet)	Pumping Test (gpm/hrs)	Pumping Level feet	Quality	Use	Remarks Log etc
	con lot			year									
3883	1515	I	37	J. PARKS	DAVIDSON 56	9	4	244	70	15	75	FR	D
3951	1510	I	36	A. HOERET	DURHAM 71	9	4	241	28	8	28	FR	D S
4521	1525	I	30	L. CHECKLEY	LUNNEY 72	•	4	175	50	10	55	FR	S
2912	1520	II	35	R. ROTH.	DURHAM 64	•	4	222	60	12	70	FR	D S
2922	1525	III	33	D. MARTIN	DURHAM 63	•	4	172	36	20	45	FR	D S
A.	TOWN OF ARTANIA		WELL #3 ARTHUR PLCE										NO LOG.
	1485	PEEL TWP		J. BEER	DURHAM 63	•	4	224	35	20	50	FR	D S
2109	1450	XIV	8										O Dug 14 cl 25 ad 150 * 150- 150 ad 175 cl 200 ad 120 ad 220 ad 224 222
2110	1482	XV	10	KELLEY BROS	DURHAM 63	•	4	195	35	10	60	FR	D S
2117	1475	XVII	9	R. WEBB.	DAVIDSON 48	5	4	75	Flow	16	20	FR	D S
2118	1490	XVIII	9	R. STREET	KERR. 64	9	4 1/4	269	30	15	45	FR	D S
2119	1475	XVII	13	C. MORTLEY	DAVIDSON 51	•	4	202	55	10	-	FR	D S
2120	1550	XVII	14	E. COFFEY	DAVIDSON 62	•	4	108	79	12	80	FR	D S



Table 4 Summary of Water Well Records

Date _____
Prepared by _____

Well No	Location and Elevation		Owner	Driller	Well Type	Well Diameter (inches)	Depth (feet)	Static Level (feet)	Pumping Test (gpm) (hrs)	Pumping Level (feet)	Quality	Use	Remarks Log etc	
	con lot			year										
2121	1550	XIV	16	C. HANSEN	DAVISON	61	●	4	161	85 ⁶	10 ⁶	106	FR	D S
													0 cl30 hp92 ad100 100 hp145 gr, m-cs 161 4-161	
2123	1450	XVII	6	A. GREEN	DURHAM	62	●	4	168	Flow ²³	20	25	FR	D S
													0 to 5 ad20 cl100 100hp, bldr 135 ad, gr 1160 4-168. 160gr 168	
2124	1475	XVII	7	W. GARDNER H. BEER	SAUDER	61	●	5	304	46 ⁶	11 ⁶	52	FR	D S
													0 63 cl21 ad30 cl60 60 ad4 ad72 cl, stw 605 ¹⁰⁵ 105 ad, ad107 cl21 hp125 cl131, 302- 131 ad, bld 160 - RECORD - MISPLACED 304	
2125	1505	XVII	10	J. RAINER	DURHAM	64	●	4	128	25 ¹²	15 ¹²	40	FR	D S
													0 62 cl20 ad30 ad4 ad60 60 ad100 ad4 ad10 ad126 126 ad, 40 gr 128 4-127	
2126	1555	XVII	11	F. GRAVELL	DURHAM	63	●	5	78	60 ²	8 ²	60	FR	D S
													0 to 2 cl, stw 40 40 ad70 ad978 4-75- 78	
2127	1550	XVII	12	J. MORRISON	PRATT	50	●	3 1/4	325	70 ⁶	6 ⁶	80	FR	D S
													0 62 cl8 stw 10 ad4 ad20 20 ad4 hp30 ad4 ad100 ad105 105 ad, ad60 ad52 hp, ad218 218 ad, ad4 ad6, 225	
2128	1425	XVII	5	J. KIONAY	DAVISON	57	●	4 1/4	234	18 ⁸	3 1/2 ⁸	140	FR	D S
													0 ad38 ad64 ad72 ⁴⁻²¹⁵ , 126 ad108 ad118 ad4 hp72 ²³² , 172 ad4 hp, ad1182 cl, ad210 ad10 ad234	
2129	1495	XVII	8	EXPORT PRODUCE CO	KEESO	58	●	4	403	30 ⁸	12 ⁸	60	FR	COM S
													0 63 ad60 ad4 ad100 ad4 ad10 ⁴⁻²¹⁹ , 100 ad4 ad160 ad4 ad200 ad200 223 210 ad4 ad223 4 gr 226	
2130	1510	XVII	9	S. EIERMAN	DURHAM	64	●	4	226	32 ²	20 ²	35	FR	D S
													0 62 ad60 hp30 ad55 ad60 ad60 ⁴⁻¹³⁵ , 60 ad90 ad135 gr137 ad150 ad165 198 45 ad175 ad185 gr1200	
2131	1513	XVII	10	B. RICHARDSON	DURHAM	63	●	4	200	48 ²⁰	5 ⁵	55	FR	D S
													0 62 ad60 hp30 ad55 ad60 ad60 ⁴⁻¹³⁵ , 60 ad90 ad135 gr137 ad150 ad165 198 45 ad175 ad185 gr1200	
3693	1490	XVII	8	W. KENNEDY	LAOCO	70	●	4	186	36 ¹⁰	10 ¹⁰	37	FR	D
													0 to 1 cl45 ad25 ad70 ⁴⁻¹⁷⁸ , 70 ad4 cl, ad490 ad4 ad113 ¹⁷⁸ , 113 cl, ad4 ad1168 ad, stw ad178 178 ad, 4 gr 186	
3813	1490	XVII	8	W. WALES	CORALTA	70	●	6	142	120 ²	2 ²	137	FR	D S
													0 cl20 ad93 cl, bld 135 ⁴⁻¹³⁵ , 135 gr 142 142	

Table 5 Summary of Water Well Records

 Date _____
Prepared by _____

Well No	Location and Elevation		Owner	Driller	Well Type	Well Diameter (inches)	Depth (feet)	Static Level (feet)	Pumping Test (gpm)(hrs)	Pumping Level feet	Quality	Use	Remarks Log etc	
	con	lot		year										
3976	1512	XII	9 L. EPOCH.	LADCO 71	•	4	280	46	5	65	FR	D	0 cl, stw, gr 234 to 280 # 278	
3542	1490	XII	11 P. TREMBLAY	HADCO 69	•	4	225	20	20	12	24	FR	D	
												S	0 cl, 140, 10 114 gr 118 # 220- 118 cl, 10 208 gr, 14 ad 225 222.	
3367	1525	A	23 INTER-CO MILK TSAT	DURHAM 69	•	4	257	48	15	55	FR	COM	0 53 ad 50 hp, 114 85 # 348- 85 ad 160 ad 20 86 25 25 215 ad 240 16 267	
1958	1530	B	23 O. MCCRITCHIE	PRATT 50	•	4	100.	34	6	55	FR	D	0 cl, stw 14 ad 20 20 cl, hp, stw 50 ad 4 cl, hp 90 # 100. 90 66 94 hp 98 gr 100	
1957	1530	B	22 P. KELLERMAN	DAVIDSON 52	•	4	495	78	5	200	FR	D	0 cl 30 gr 90 to 269 # 491 269 90 495	
1956	1530	B	14 E. SNOWE	DAVIDSON 60	•	5	161	67	7	78	FR	D	0 gr 40 hp 78 ad 91 20 # 161 120 ad 4 hp 133 91 4 hp 118 48 hp 157 gr 161	
1953	1558	A	8 L. FLEMING	DAVIDSON 69	•	4½	261	100	6	12	115	FR	D	0 146 8 hp 43 ad gr, stw 55 # 361 55 hp 10 ad 4 gr 136 ad 4 hp 200 200 ad 4 gr 227 ad 261 16-
2999	1525	I	3 J. SAUNDERS	DAVIDSON 57.	•	4	271	80	15	25	FR	D	0 to 65 cl, gr 42 hp 72 # 271 72 ad 4 gr 98 ad 124 ad 158 158 ad 4 hp 234 ad gr, 100 270 ad 211	
3000	1525	I	3 S. J. HILLISOP J. RENNIE	LADCO 65	•	4	324	40	10	60	FR	D	0 146 80 ad 60 ad 180 # 315- 180 gr, 140 215 ad 235 ad, 140 245 222 245 ad 265 to 324	





ARTHUR GROUND WATER SURVEY

Table 1 Summary of Water Analyses

Prepared by SS.

P1

Source and Number	Location	Date Sampled	pH	Colour Hazen Units	Turbidity Jackson Units	Specific Conduct- ance mmhos at 25°C	Total Dissolved Solids (ppm)	Total Hardness as CaCO ₃ (ppm)	Alkalinity as CaCO ₃ (ppm)	Chemical Constituents in parts per million (ppm)												Remarks
										Chloride (Cl)	Sulphate (SO ₄)	Iron (Fe)	Calcium (Ca)	Magne- sium (Mg)	Sodium (Na)	Potassium (K)	Free Ammonia (N)	Total Ammonia (N)	Nitrite (N)	Nitrate (N)	Odour on Arrival	
WELL 1	4585 E SHAW.	SEPT 10, 1975	7.8	10	2.5	435	283	216	219	1	18	.35	50	22	10	0.9	.1	0.1	1.02	1.2	Nil	8/rx - 120-121 lb.
.. 2	3009 G. PRENTIE	"	7.9	20	6.5	390	254	176	213	4	3	.55	38	19	18	0.8	.2	0.3	1.02	.4	"	8/rx - 123 n.s.
.. 3	88 J. McCABE	"	7.9	40	10	540	351	242	211	12	73	1.2	53	27	25	1.3	.2	0.3	1.02	1.2	"	8/rx - 144 c.s.
.. 4	89 R. RANDALL.	"	7.9	100	34	580	377	258	222	14	82	2.1	59	27	29	1.4	.2	0.3	1.02	1.2	"	8/rx - 230-263 L
.. 5	1 ARTHUR PUC	"	7.7	15	5.5	2050	1353	1270	208	70	1040	.40	372	93	38	2.9	.3	0.3	1.02	1.2	"	8/rx - 530 L
.. 6	2 ARTHUR PUC	"	7.9	5	1.0	580	377	264	203	9	110	.05	64	25	26	1.1	.1	0.3	1.02	1.2	"	8/rx - 285 L
.. 7	104 PENTECOSTAL	"	8.0	10	1.6	450	293	174	203	2	38	.10	38	19	31	1.1	.2	0.3	1.02	1.2	"	98 - 140- g.l.
.. 8	27 SANTON 9 DO	"	8.1	15	3.6	405	263	148	203	1	17	.35	34	15	33	1.1	.2	0.4	1.02	1.2	"	98 - 162- g.l.
.. 9	264 W. GARDNER	"	7.6	70	32	1750	1138	1060	188	45	870	1.6	976	90	30	2.3	.3	0.3	1.02	1.2	"	98 - 105-107-8d 8/rx - 302-304-?
.. 10	3542 P. TECUMSEH	"	7.9	60	26	395	257	154	215	41	4	1.2	37	15	29	1.0	.2	0.2	1.02	1.2	"	98 - 320-222- g.l.
.. 11	220 W. WEBB	"	8.2	15	2.2	355	231	150	194	41	2	.40	26	21	26	0.9	.5	0.5	1.02	1.2	"	98 - 101 g.l.
.. 12	1956 E. SHAW	"	8.0	16	2.2	425	276	210	216	2	15	.35	50	21	10	1.7	.1	0.2	1.02	1.2	"	98 - 101 g.l.

Table 2 Summary of Water Analyses

Prepared by

MINISTRY OF THE ENVIRONMENT

TABLE 1 SUMMARY OF BACTERIOLOGICAL RESULTS

PREPARED BY

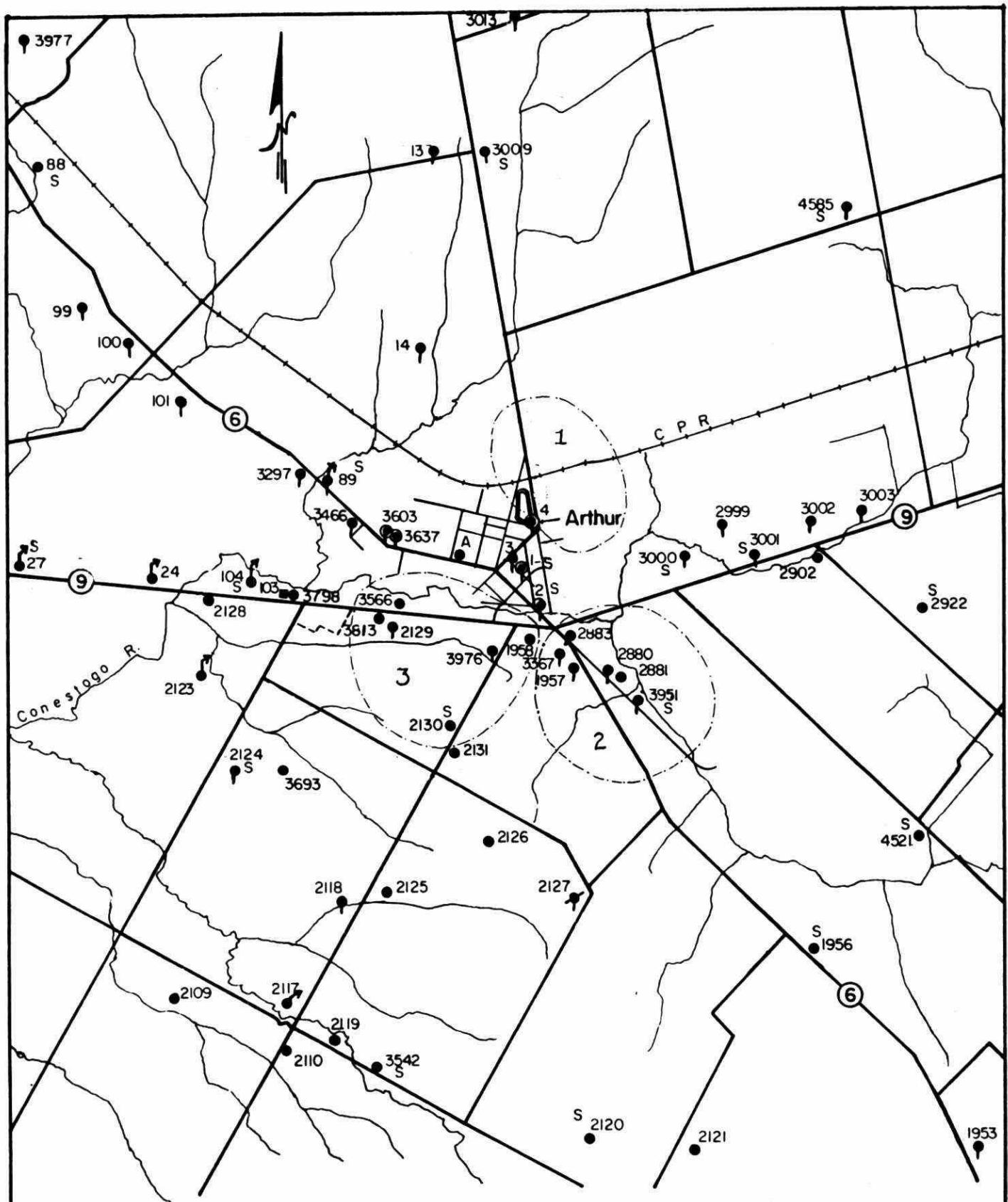
	DATE	FECAL COLIFORMS	FECAL STREPTOCOCCUS	TOTAL COLIFORMS	BACKGROUND COLONIES	
1	4585 E SHAW	SEPT 10/75	0	0	0	8
2	3009 G PRENTICE		0	0	0	
3	88 J. McCABE		0	2	0	58
4	89 R RANDALL		0	0	0	496
5	#1 PUC		0	0	0	22
6	#2 PUC		0	0	0	
7	104 PENTECOSTAL		0	0	0	0
8	27 SANTONACO		0	0	0	
9	2124 W GARDEN		0	2	0	4
10	3542 P TREMBLAY		0	0	0	
11	2120 W WEBB		0	0	0	
12	1956 E SNOWE		0	0	26	19,000
13	2130 S LIEMAN		0	0	0	

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TABLE 2 SUMMARY OF BACTERIOLOGICAL RESULTS

PREPARED BY

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LEGEND

- Drilled well in overburden
- Drilled well in bedrock
- Municipal well
- Dug well
- ∅ Abandoned well ⚡ Flowing well
- S Sample location
- Favourable test drilling area

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VILLAGE OF ARTHUR
GROUND WATER SURVEY
WELL RECORD & RECOMMENDED
TEST DRILLING LOCATIONS

Date: Sept 75

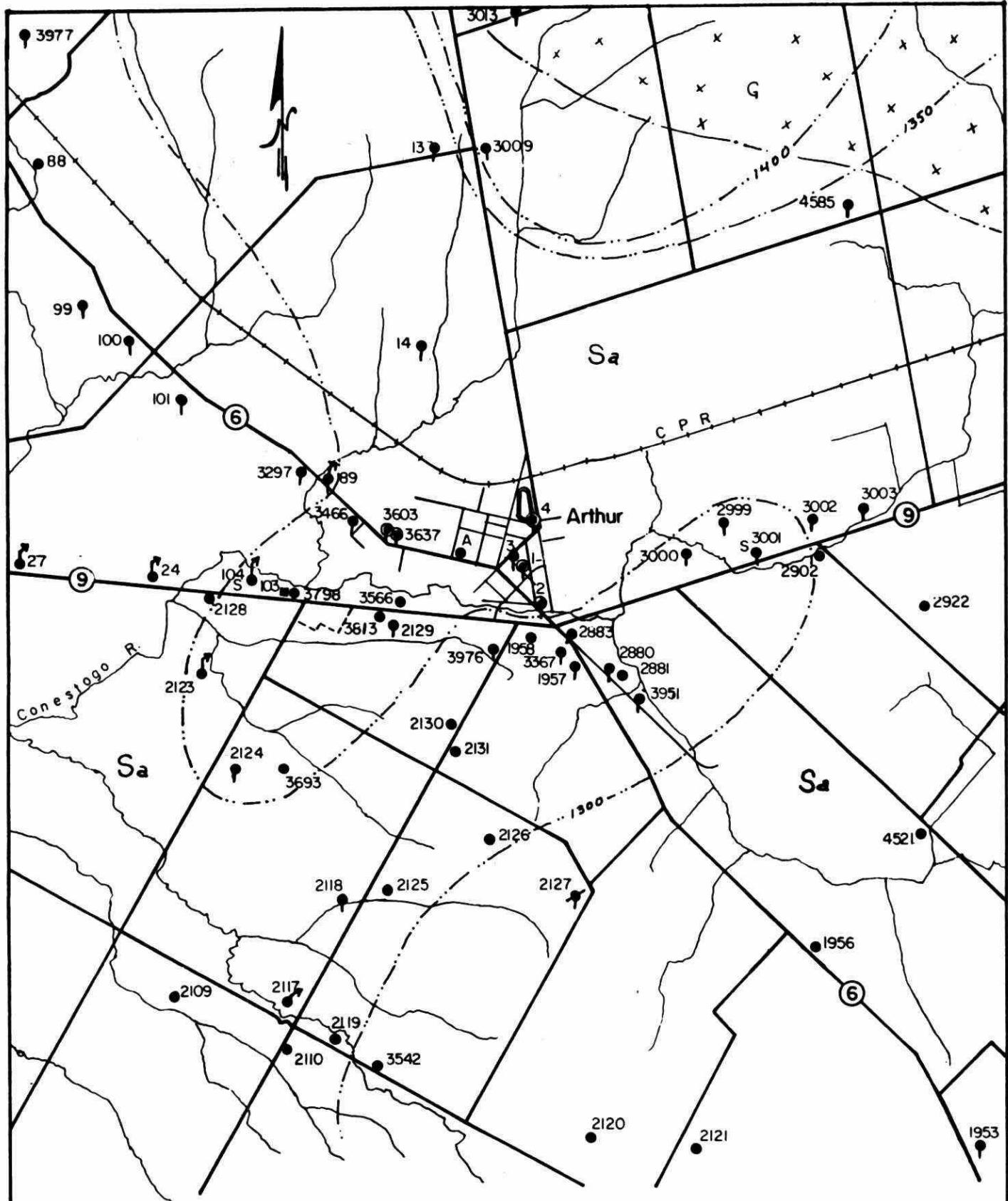
Scale:

Drawing No:

Prepared by: SFS

1 in = 0.79 mi

1



LEGEND

- Drilled well in overburden
- Drilled well in bedrock
- Municipal well
- Dug well
- ✗ Abandoned well
- ♂ Flowing well
- Guelph - Salina contact
- Bedrock Topography elevation above msl

MINISTRY OF THE ENVIRONMENT

VILLAGE OF ARTHUR
GROUND WATER SURVEY

BEDROCK GEOLOGY & TOPOGRAPHY

Date: Sept 75	Scale:	Drawing No:
Prepared by: SFS	1 in = 0.79 mi	2